MAS 711 - Monitoring system for pumps

- Reliable operation
- Low LCC
- Easy handling

MAS 711 - Monitoring system for pumps

Protection of one pump

- Stop of pump (A-alarm)
- Early warning (B-alarm)

Status and communication

- Data & alarm recording
- Web tool for viewing, fault analysis and setup
- Integral part of Flygt's pump control and SCADA system (or other systems on the market)
- Input for smart pump control

- Feedback to R&D

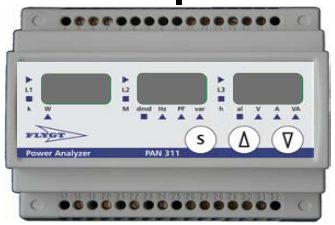
MAS – System

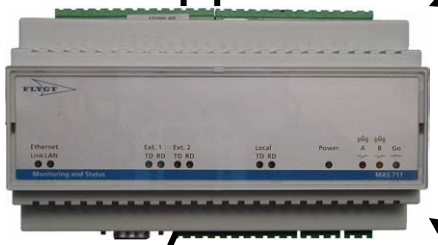
Operator panel

FMC

AquaView

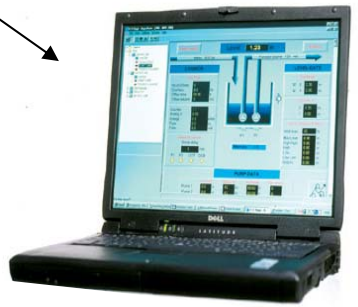
Power analyzer



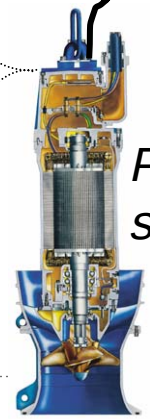


Base unit

Web pages



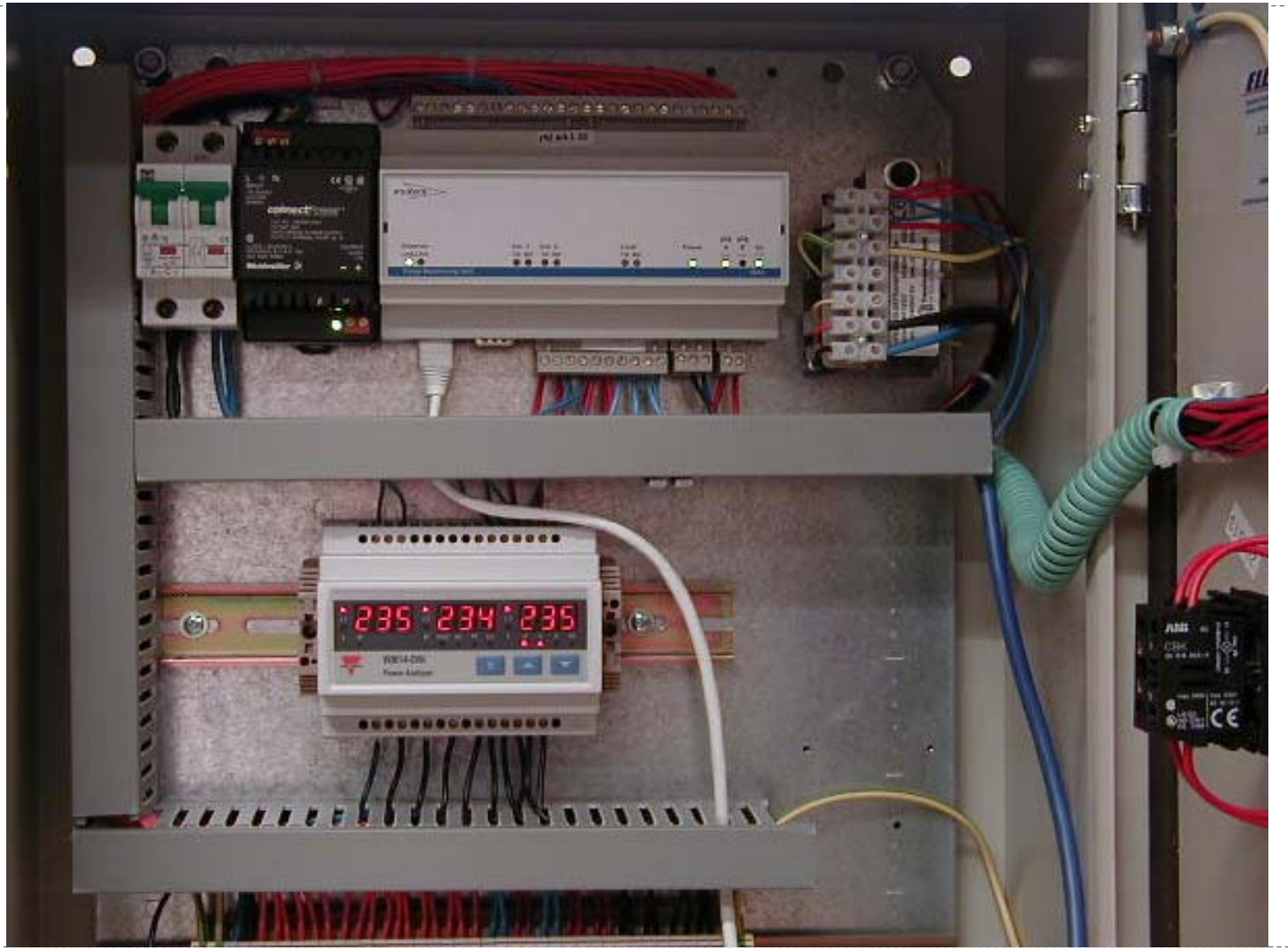
Pump memory



Pump sensors

Door mounted Operator panel

DIN-rail mounted Base unit and Power analyzer

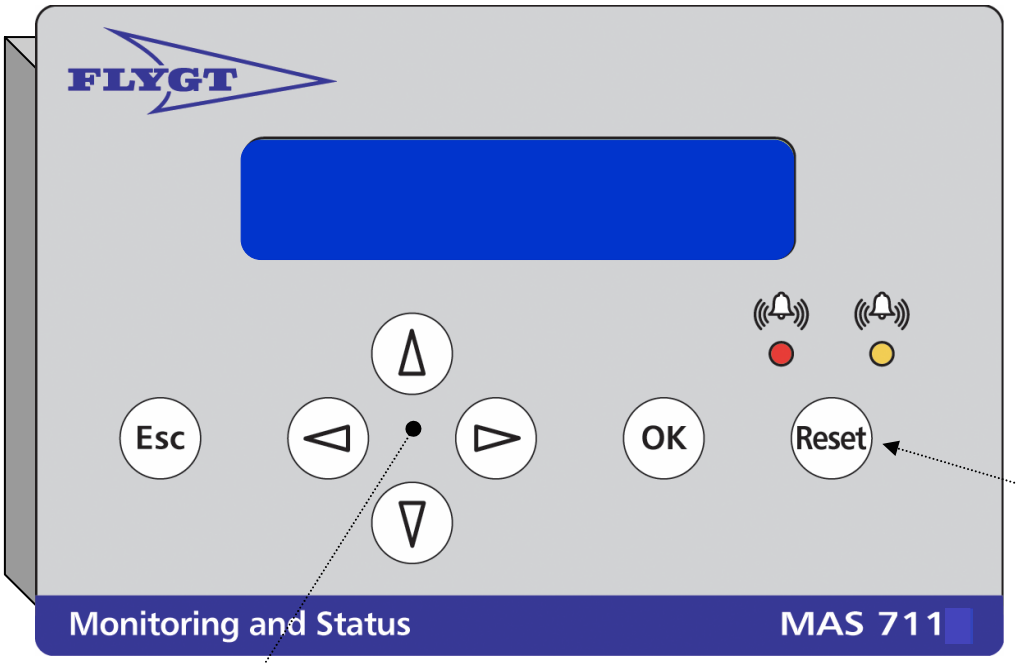


MAS – Base unit

- Connection of sensors
- Memory for logging
- Embedded web pages
- Alarm relays and LED:s
- Pump interlock relay
- Serial comm. ports
- LED:s indicate comm.
- …

Operator panel (with new design)

Display for alarm indication, setup etc.



Alarm indication

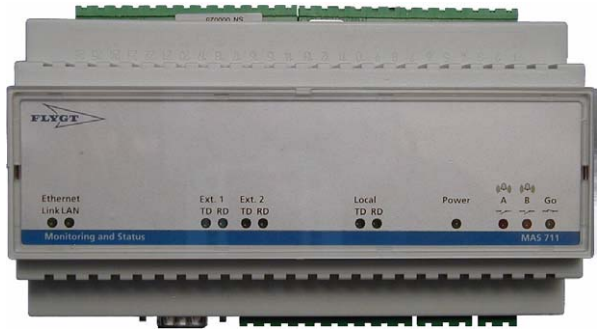
- Pump stop
- Warning

Alarm reset

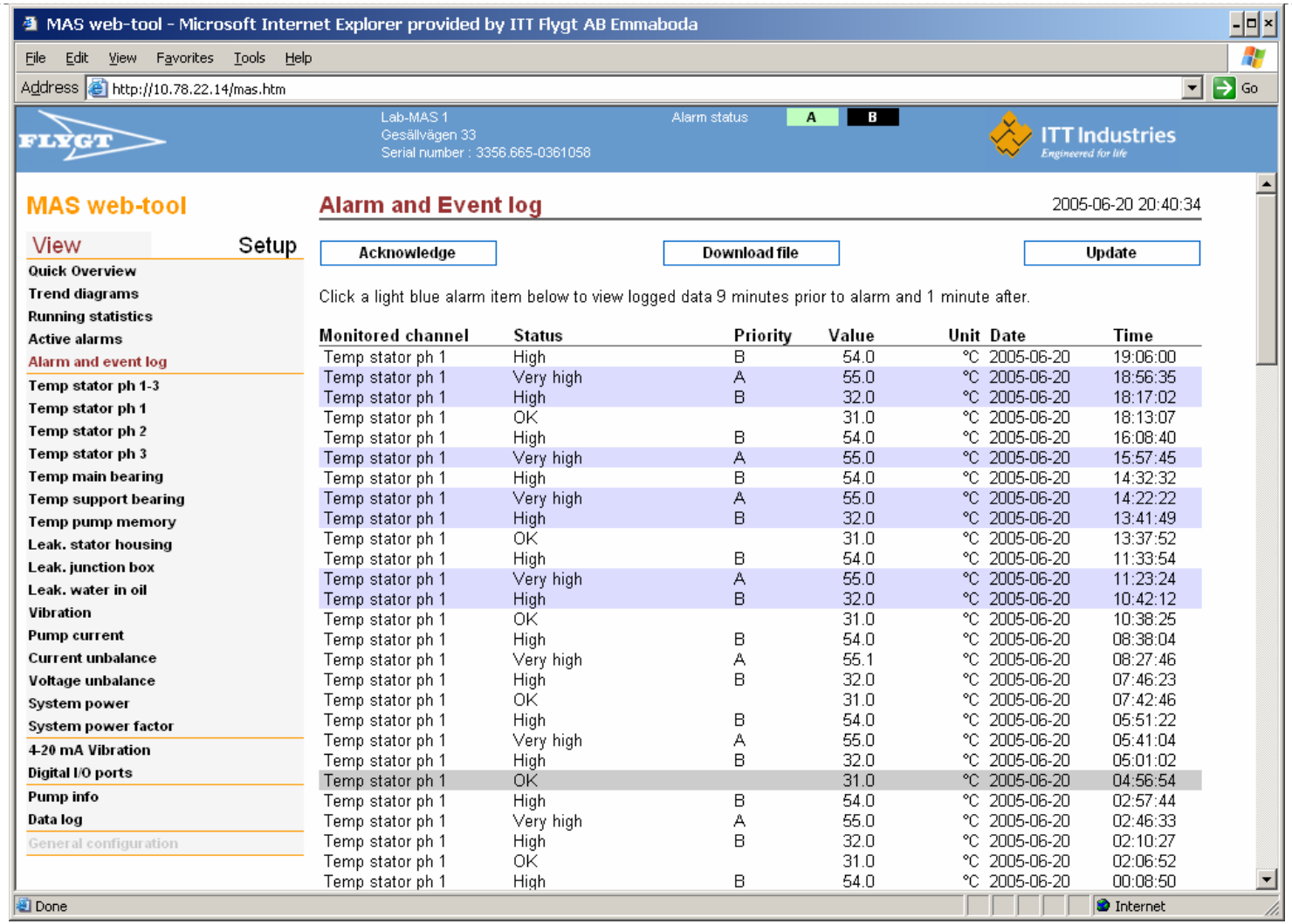
Keys for menu navigation

MAS feature - Embedded web pages

- Embedded web pages in Base unit
- Access with PC and web browser
  - Locally with a laptop
  - LAN
  - Internet
  - Modem

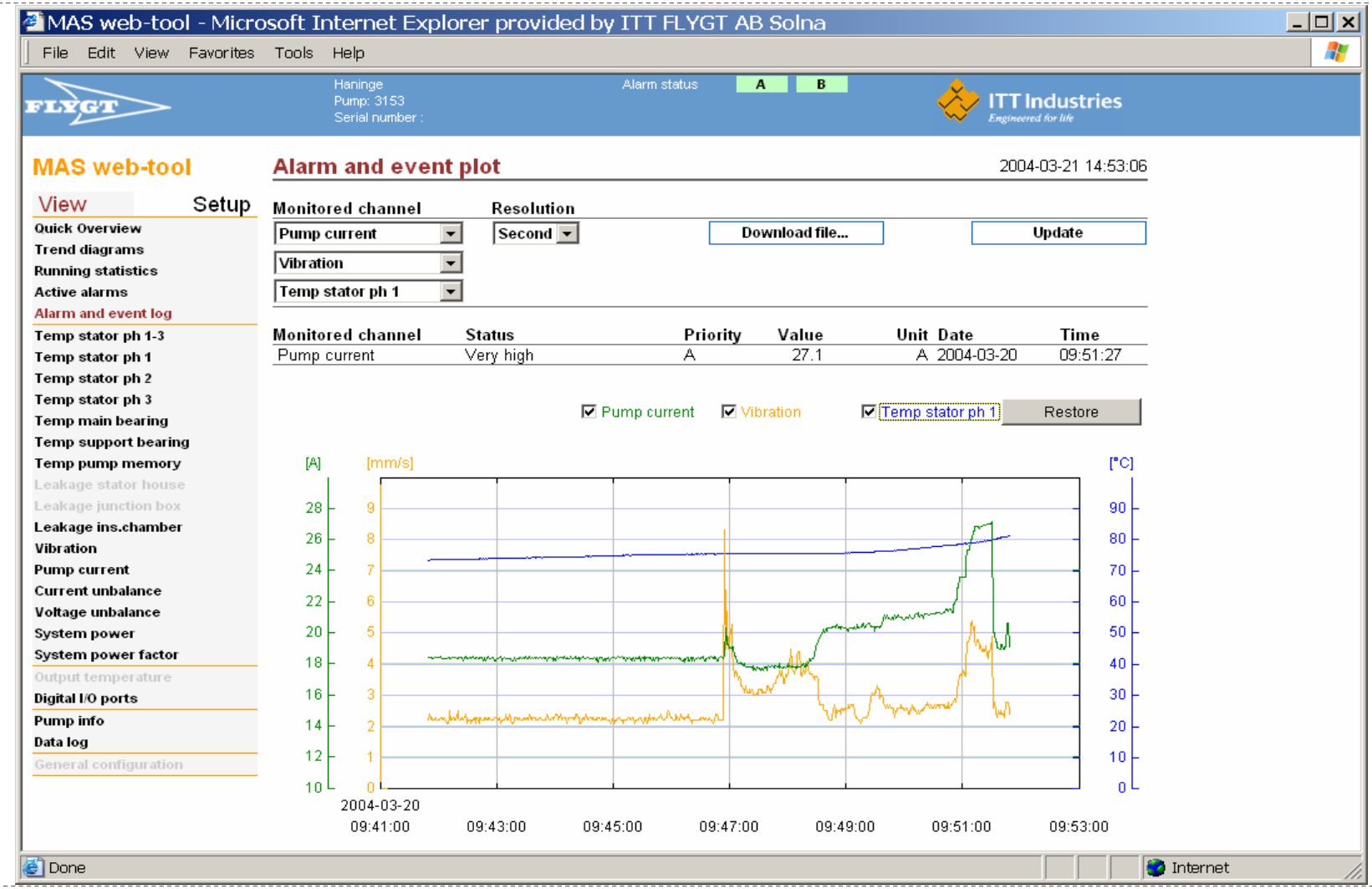


MAS feature: Alarm log plot (1s resol.)



Flygt
ITT Industries

MAS feature: Alarm log plot (1s resol.)



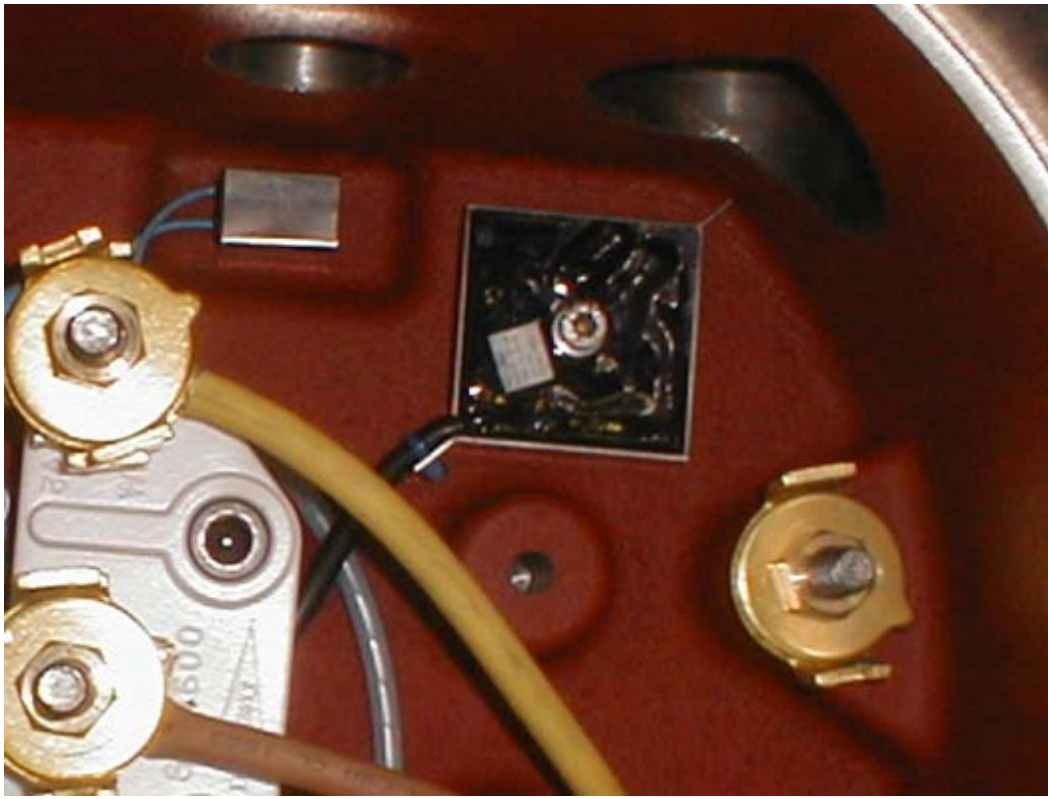
MAS feature: Alarm log plot (1 min. resol.)

VIS10 Vibration sensor

VIS10 - New sensor introduced with MAS!

VIS10 used to warn:

- at clogging
- at bad attachments
- at high level due to natural frequencies
- for loose and broken parts
- for defect bearings

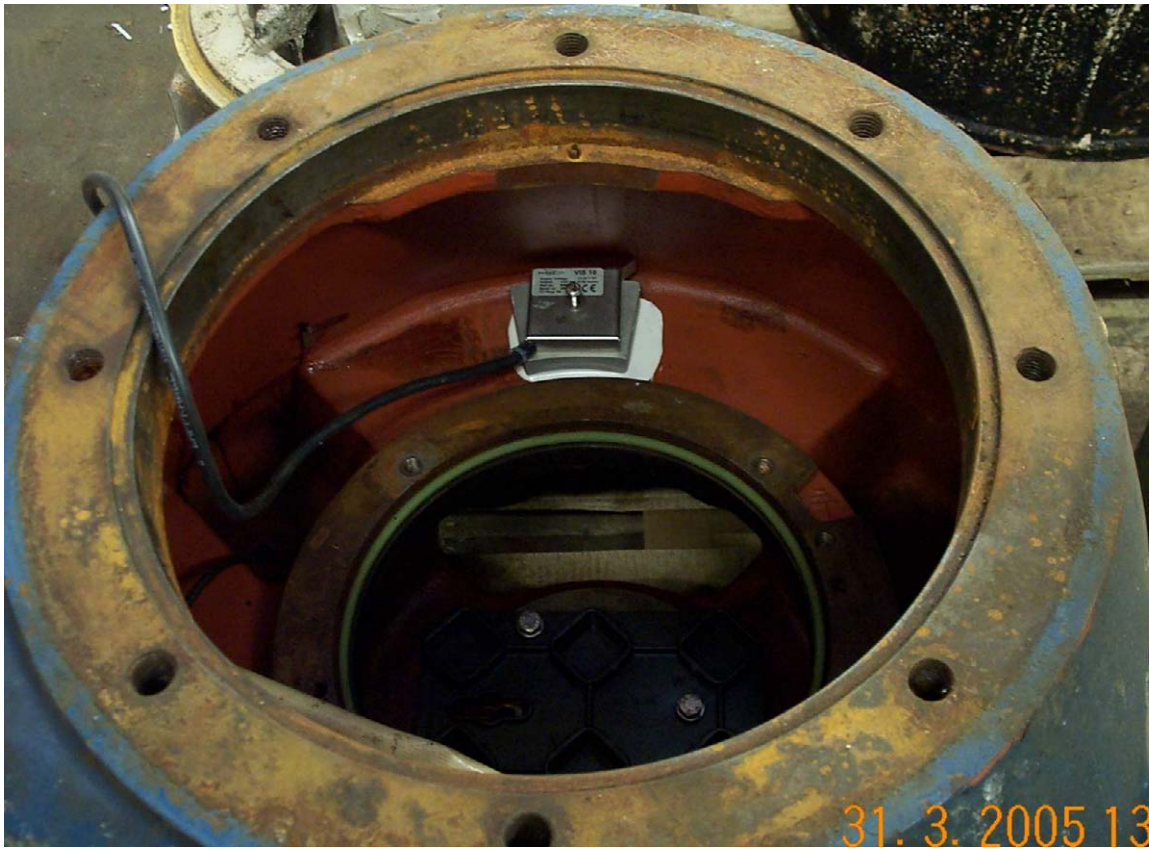


- Mounted in the pump top
- Measures in one direction

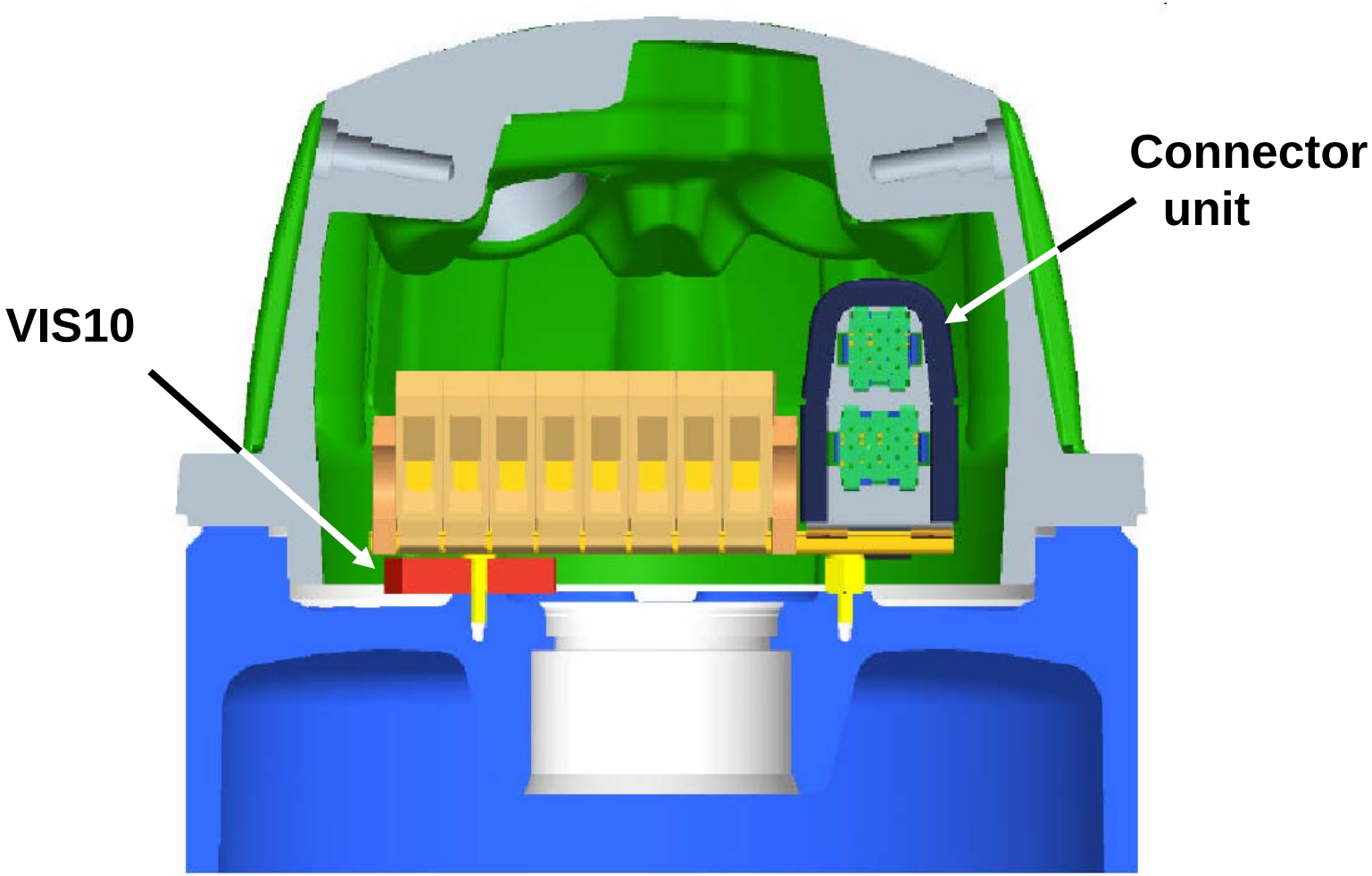
CP3800 EX application

Abbey Mills pumping station London

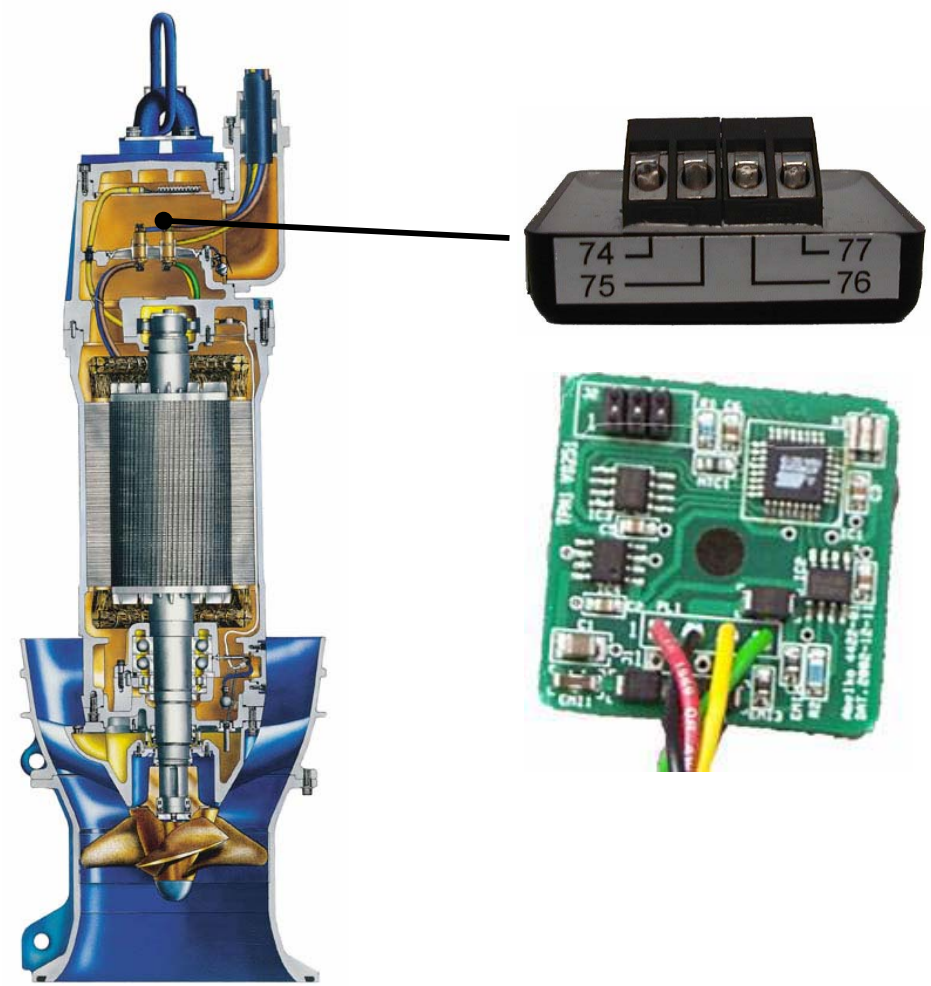
16 * CP3800 retrofit with MAS and VIS10



VIS10 Vibration sensor in a 3202



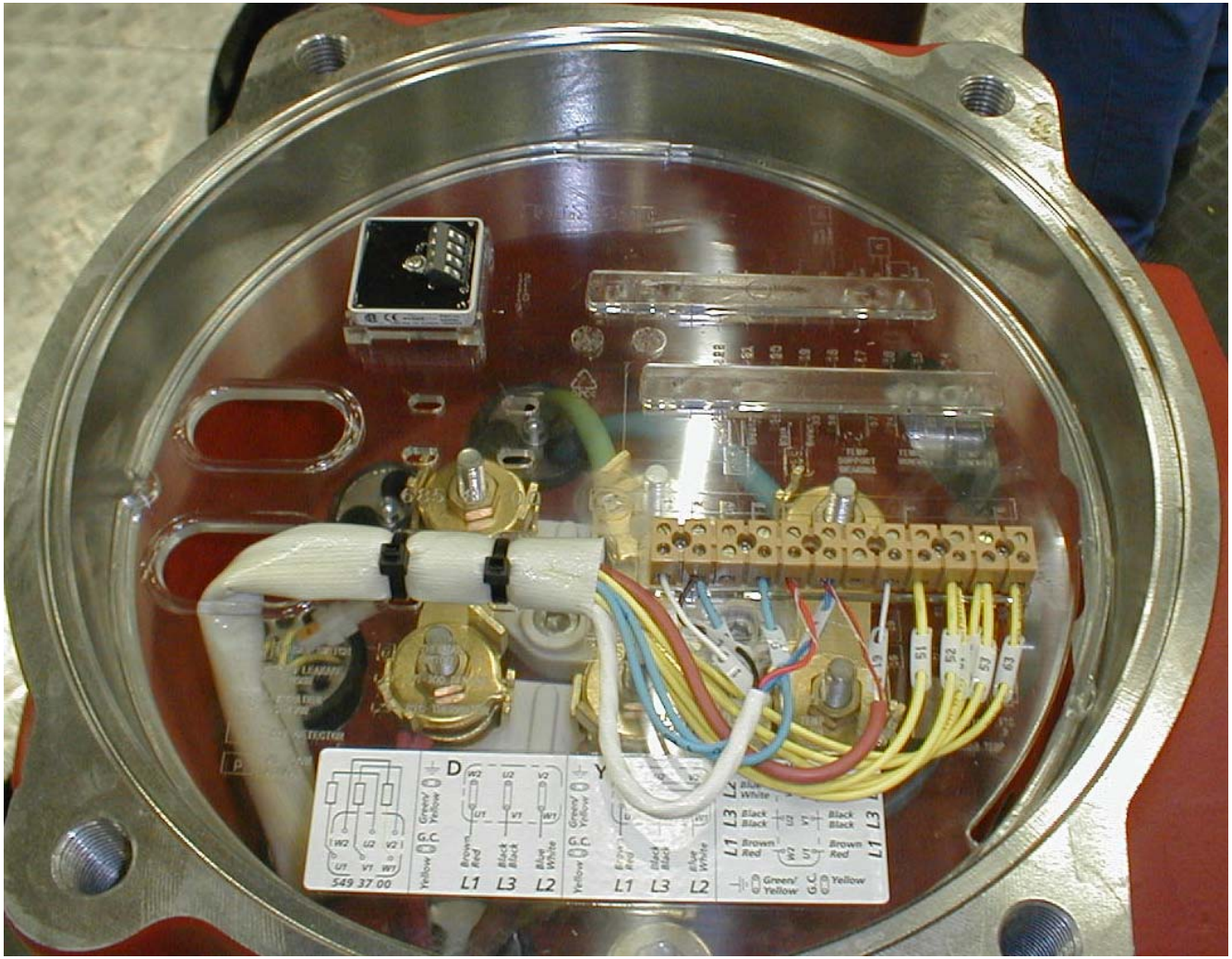
MAS feature: Pump memory



32 kByte (EEPROM)

- Data plate info
- Sensor configuration
- Starts&running time
- Service log
- Histograms
- Temp sensor on the board

Pump memory placement



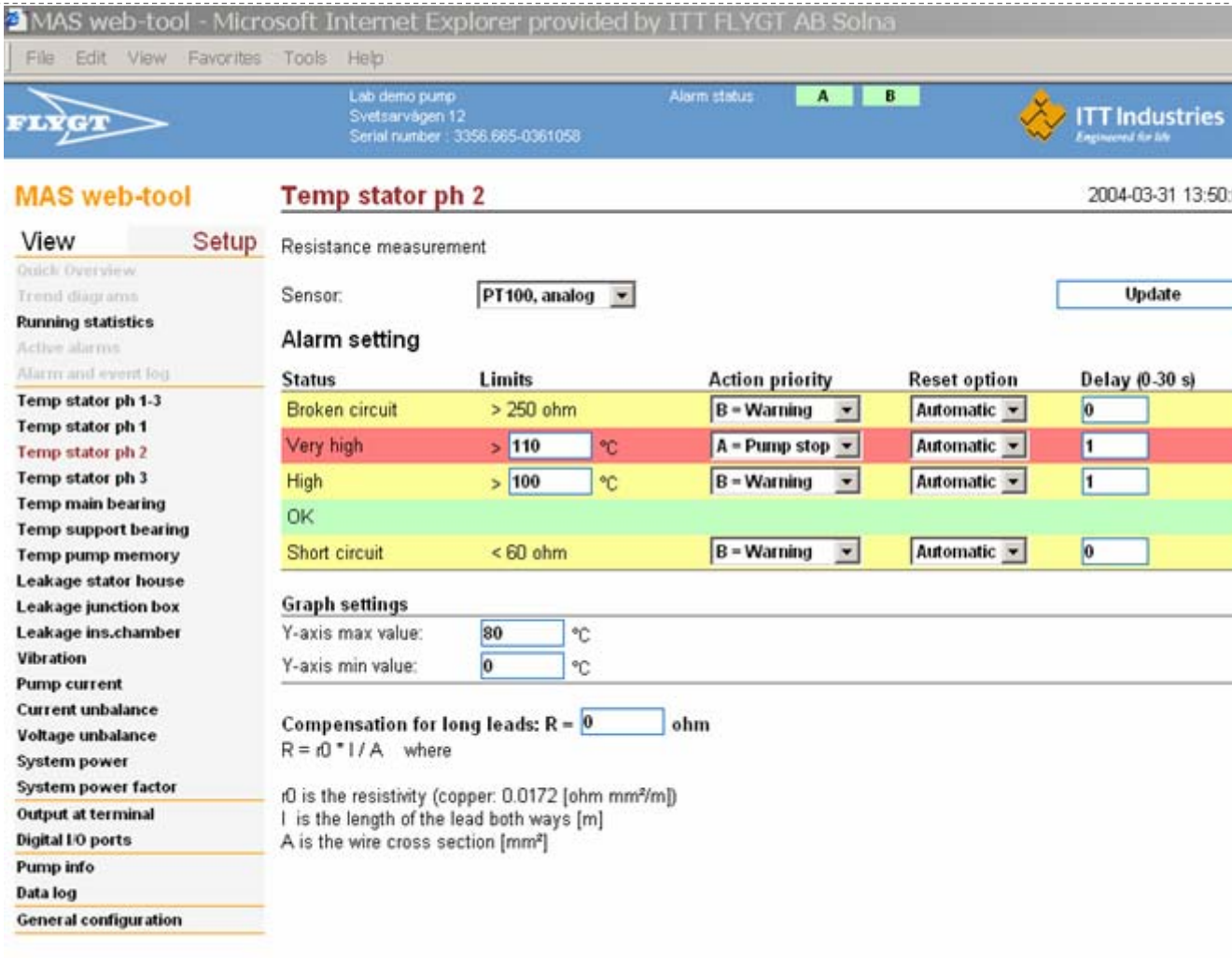
Data plate information

Serial number	3306/705-0271042
Product number	3306/705-5049
Approvals	CE
Curve number	53-610
Voltage	400 V
Current	202 A
Delivery connection	D
Rated power, shaft	100 kW
Input power	109 kW
Cos phi	0,78
Weight	1520 kg
Ambient temp.	40 degC

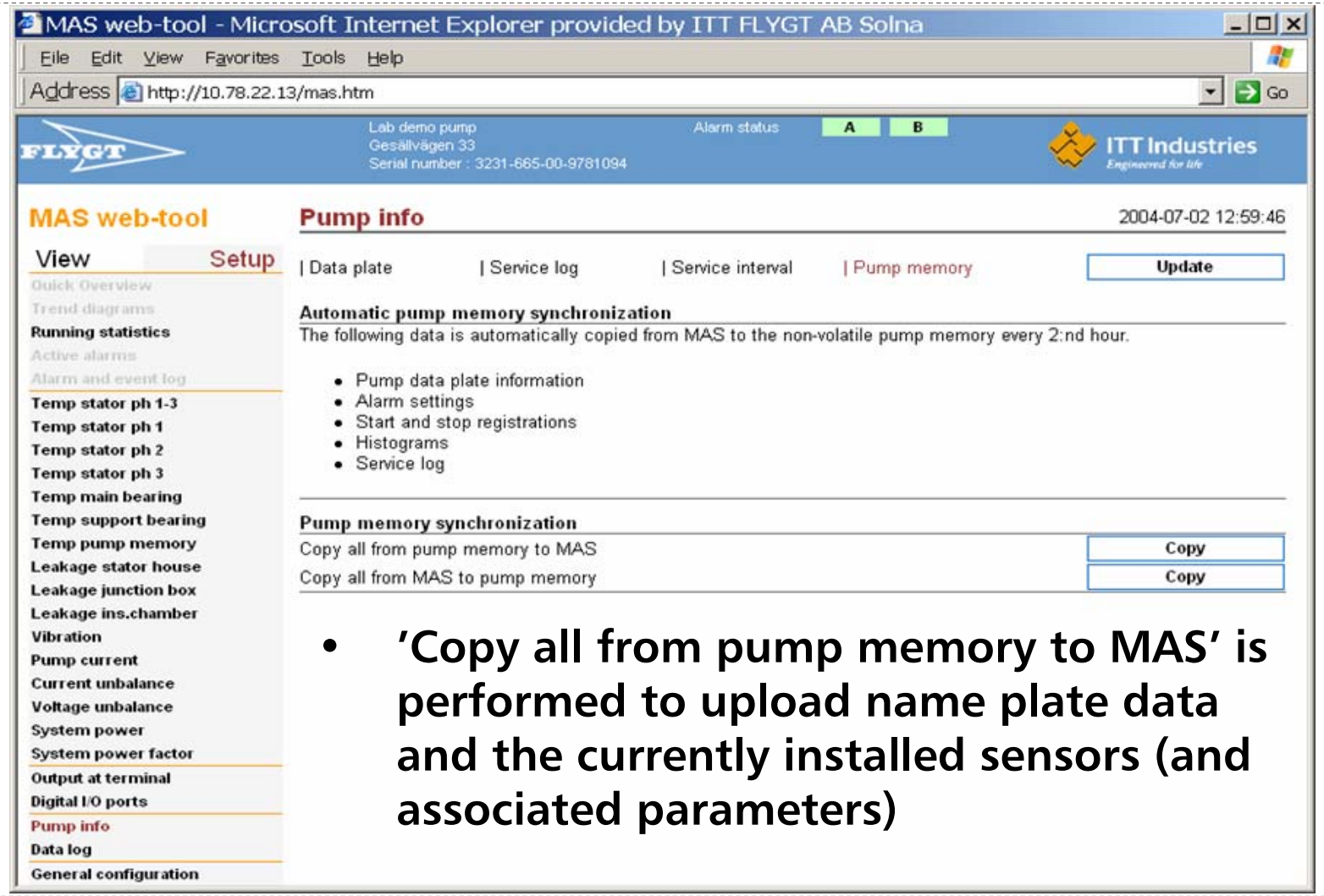
Customer settings in pump memory

The customer's selection of sensors are factory preloaded into the pump memory

This is uploaded at installation

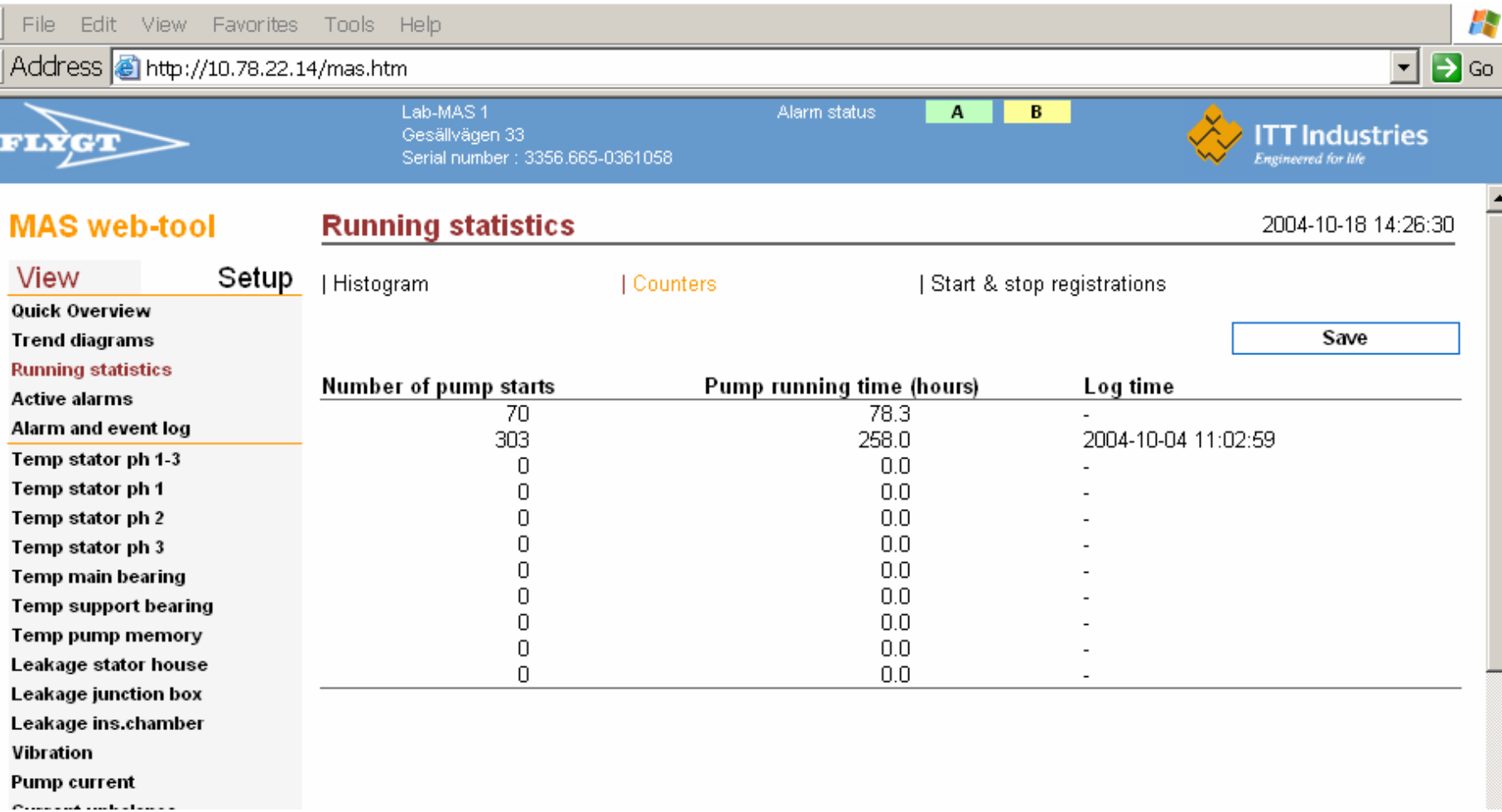


Upload of sensor settings from pump memory



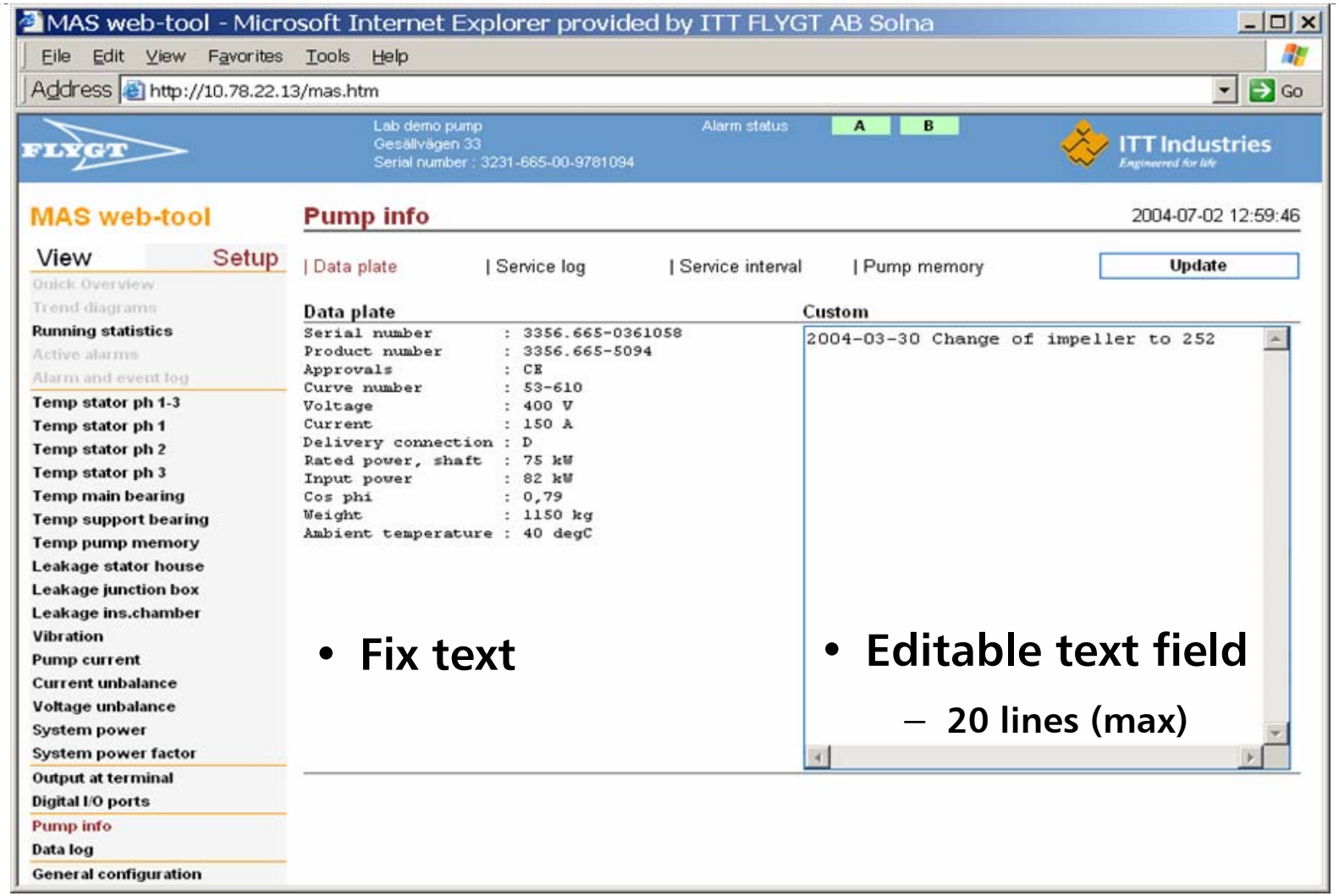
- 'Copy all from pump memory to MAS' is performed to upload name plate data and the currently installed sensors (and associated parameters)

Start and running time registrations

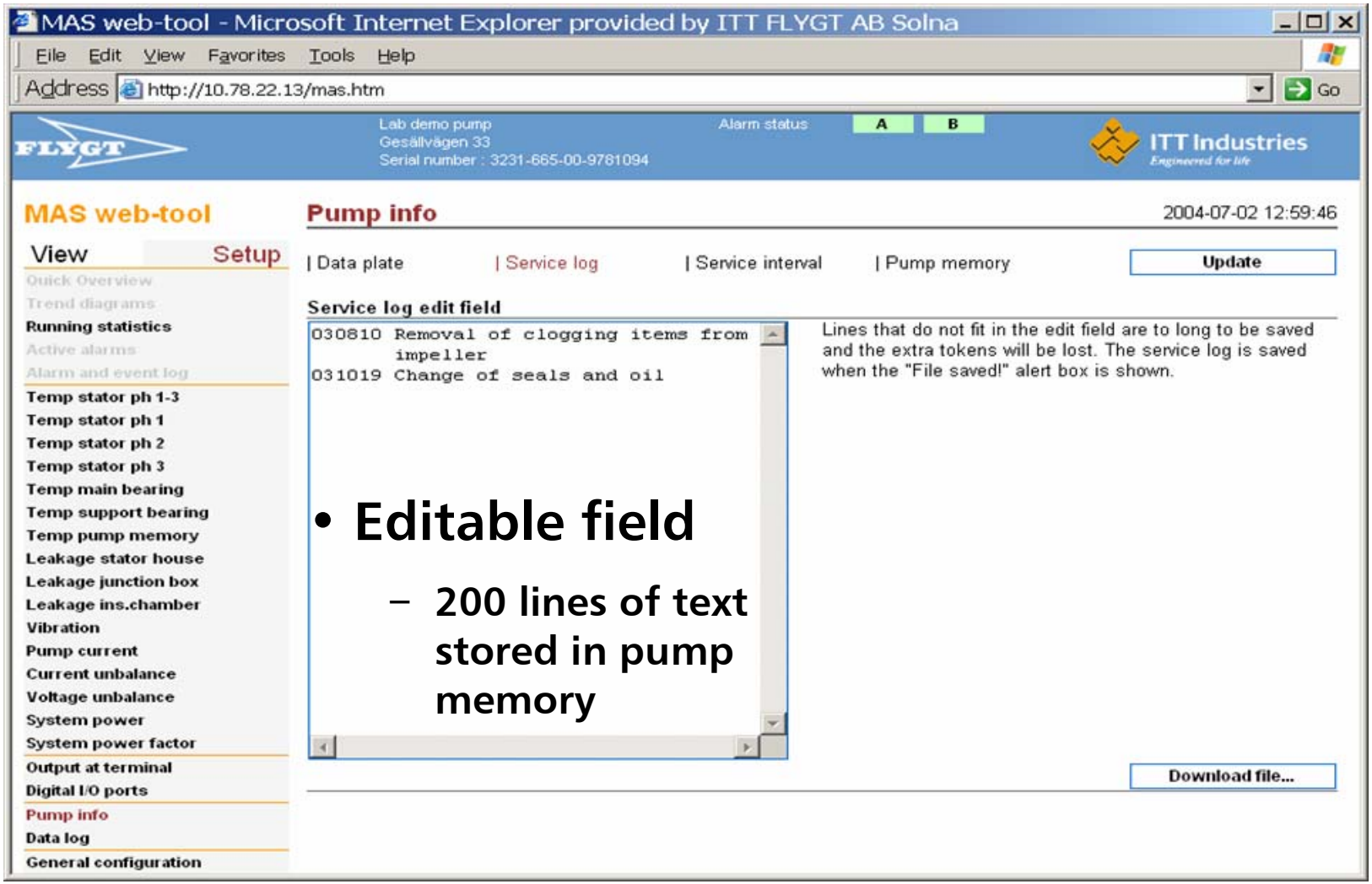


Number of pump starts	Pump running time (hours)	Log time
70	78.3	-
303	258.0	2004-10-04 11:02:59
0	0.0	-
0	0.0	-
0	0.0	-
0	0.0	-
0	0.0	-
0	0.0	-
0	0.0	-
0	0.0	-
0	0.0	-

Data plate

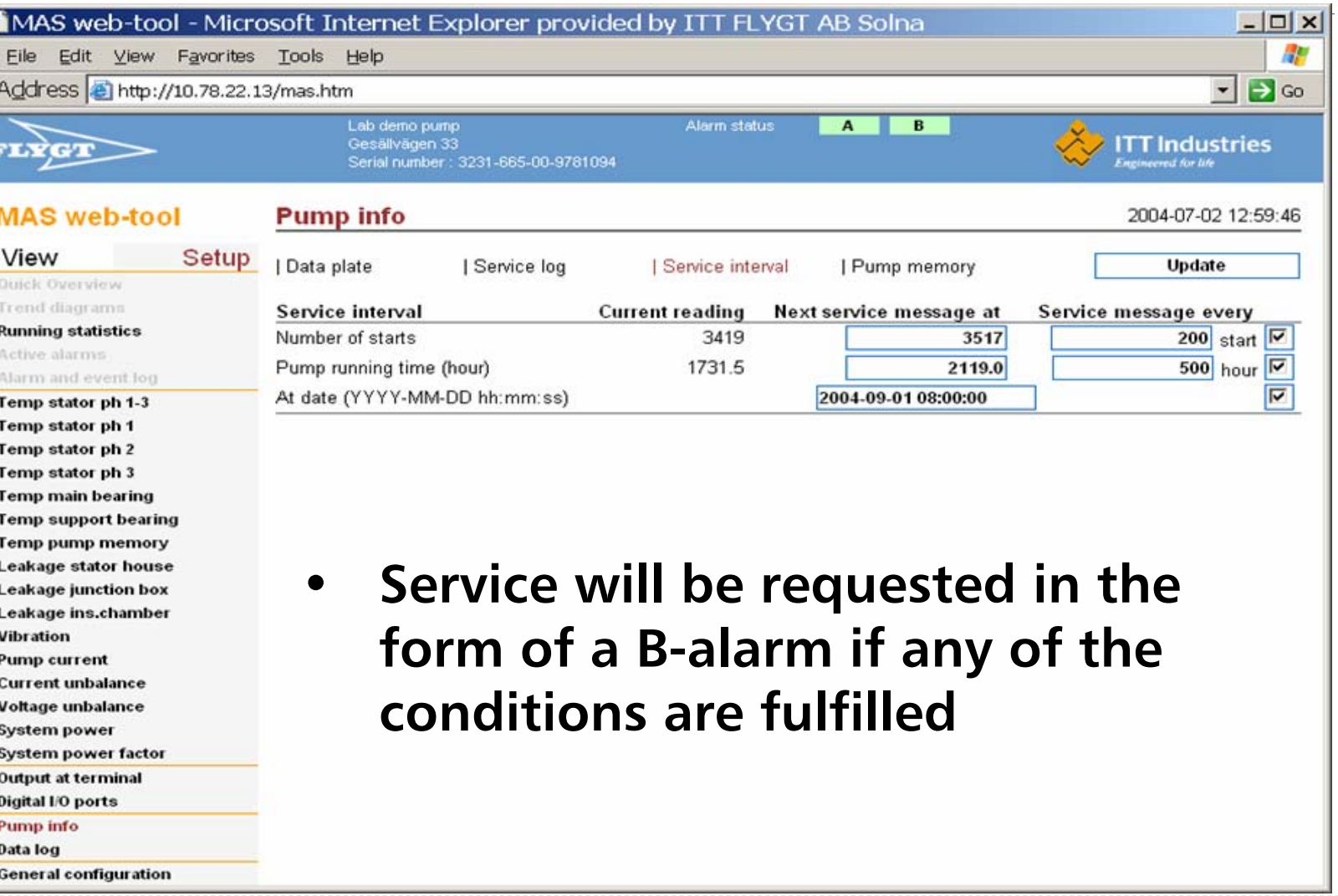

MAS web-tool - Microsoft Internet Explorer provided by ITT FLYGT AB Solna
File Edit View Favorites Tools Help
Address http://10.78.22.13/mas.htm
Go
FLYGT
Lab demo pump
Gesällvägen 33
Serial number : 3231-665-00-9781094
Alarm status A B
ITT Industries
Engineered for life
MAS web-tool
View Setup
Quick Overview
Trend diagrams
Running statistics
Active alarms
Alarm and event log
Temp stator ph 1-3
Temp stator ph 1
Temp stator ph 2
Temp stator ph 3
Temp main bearing
Temp support bearing
Temp pump memory
Leakage stator house
Leakage junction box
Leakage ins.chamber
Vibration
Pump current
Current unbalance
Voltage unbalance
System power
System power factor
Output at terminal
Digital I/O ports
Pump info
Data log
General configuration
Pump info
2004-07-02 12:59:46
| Data plate | Service log | Service interval | Pump memory
Update
Data plate
Serial number : 3356.665-0361058
Product number : 3356.665-5094
Approvals : CE
Curve number : 53-610
Voltage : 400 V
Current : 150 A
Delivery connection : D
Rated power, shaft : 75 kW
Input power : 82 kW
Cos phi : 0,79
Weight : 1150 kg
Ambient temperature : 40 degC
Custom
2004-03-30 Change of impeller to 252
• Fix text
• Editable text field
– 20 lines (max)

Service log



- **Editable field**
  - **200 lines of text stored in pump memory**

Service interval (request)



- **Service will be requested in the form of a B-alarm if any of the conditions are fulfilled**

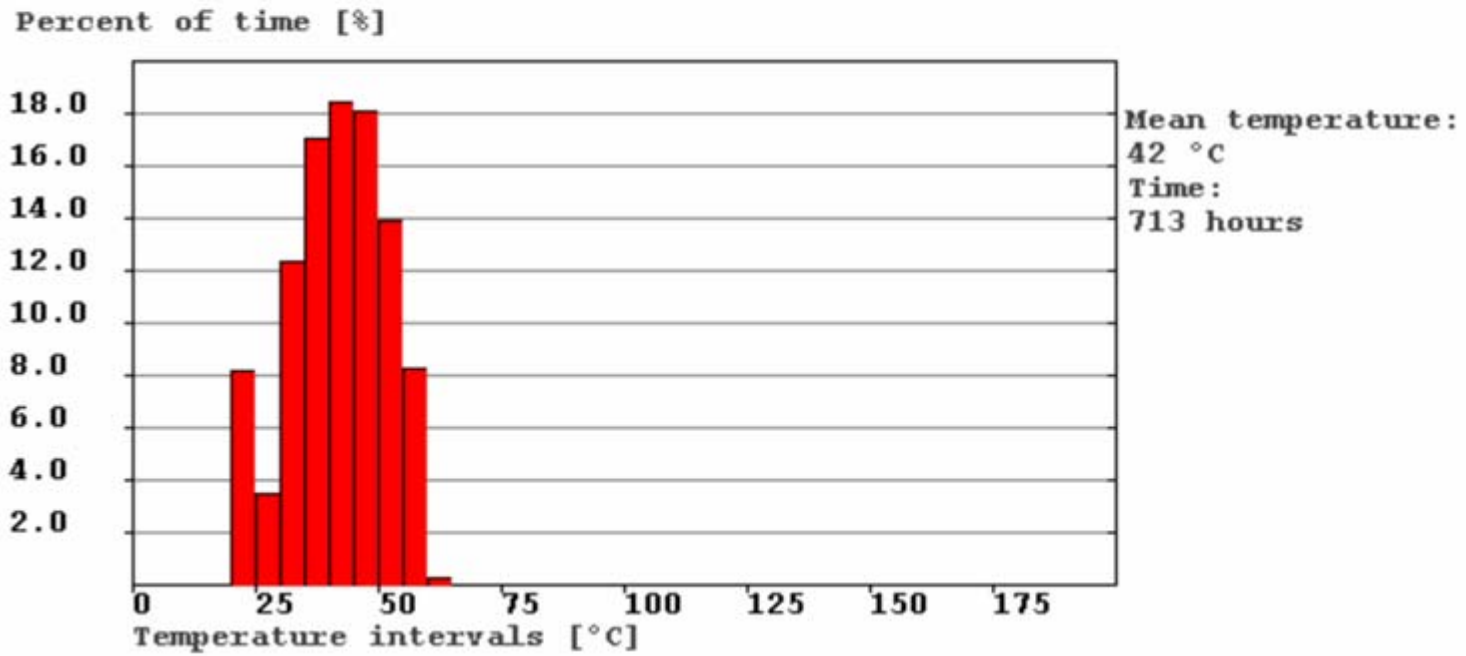
Histograms stored in pump memory

Running statistics

2004-03-31 13:53:27

| Histogram | Counters | Start & stop registrations

Histogram: Temp stator ph 1 | November | Update

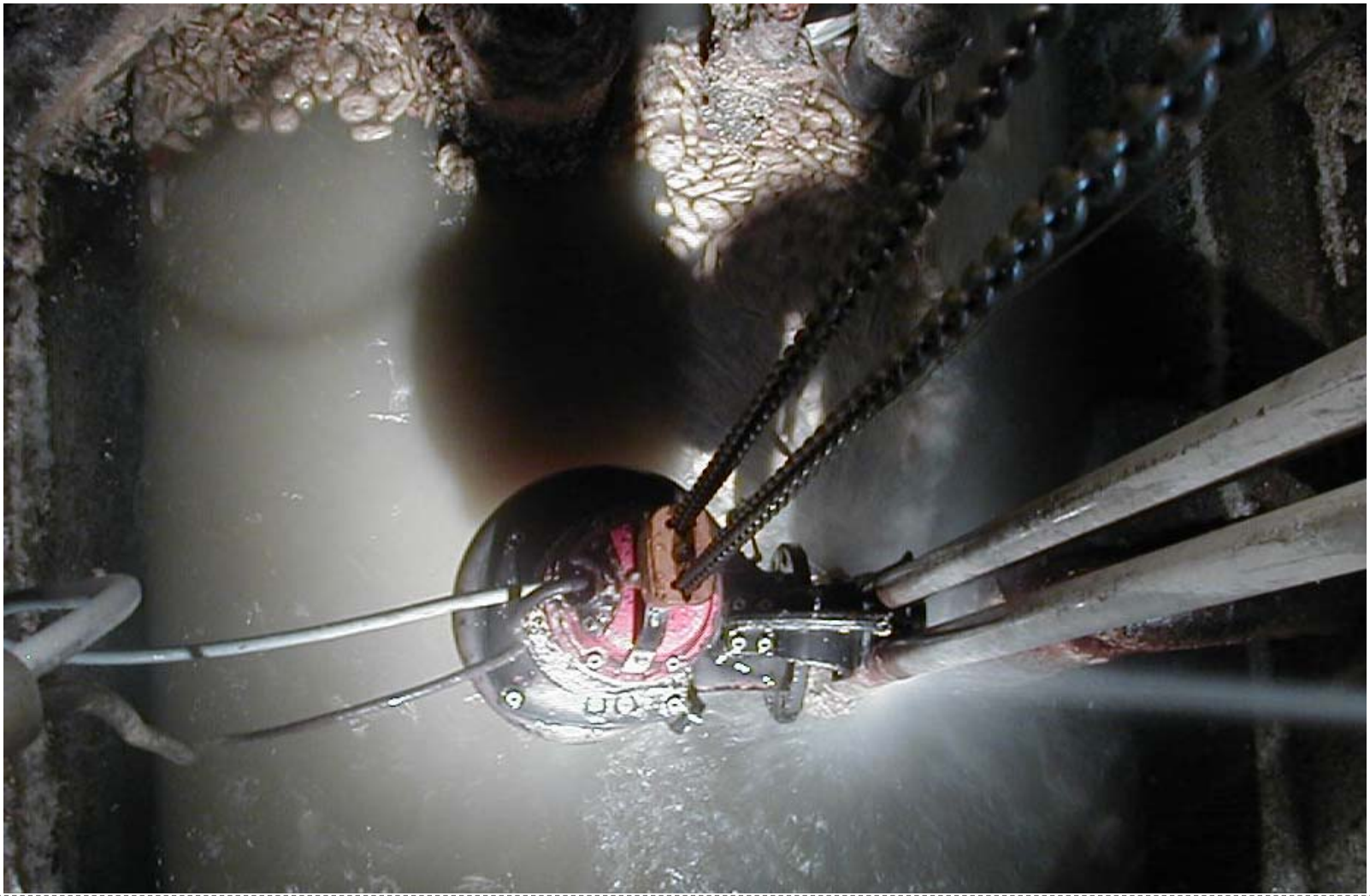


Alarm on CAS (present monitoring relay)

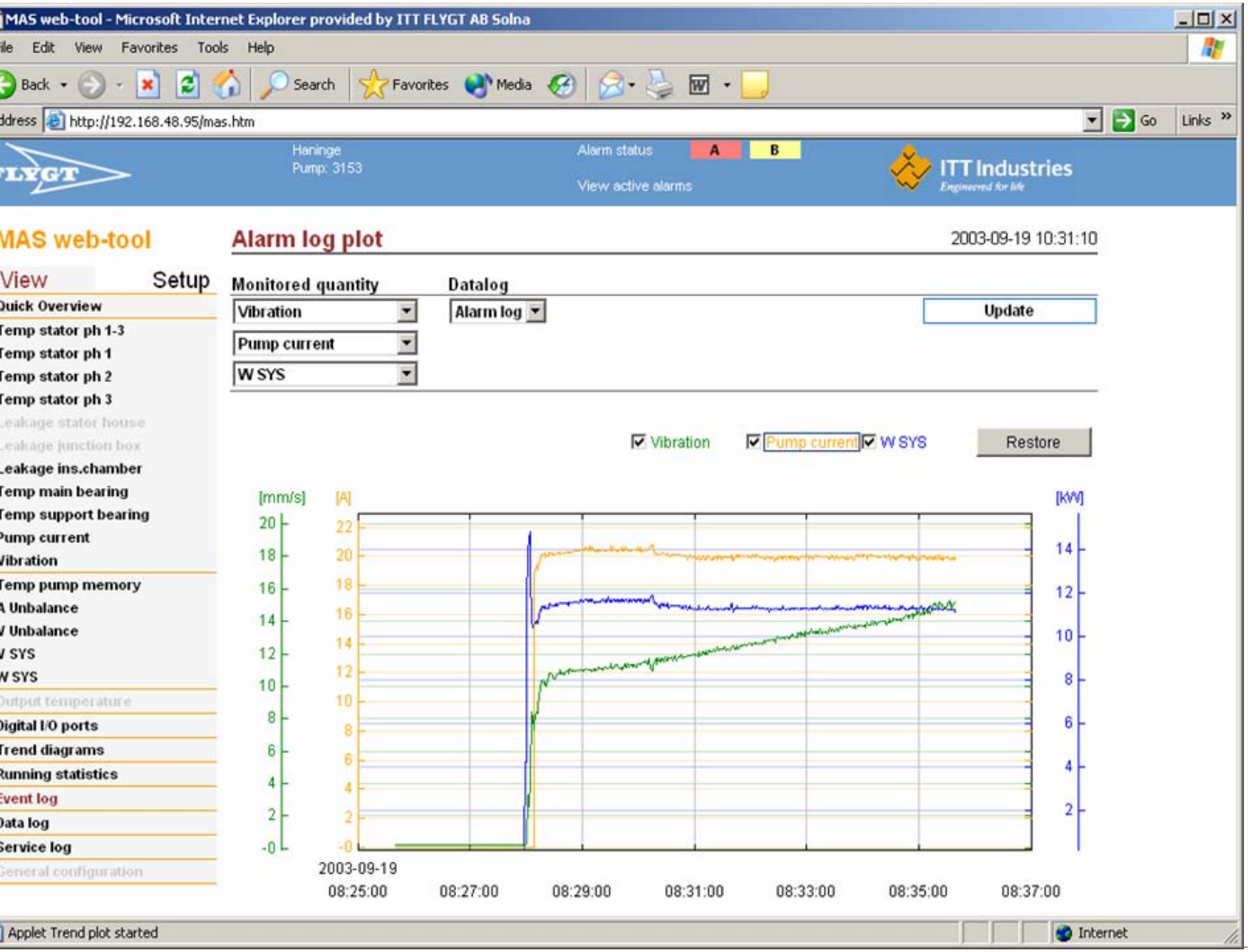
High temp alarm

- What is the cause?
- High current?
- Clogging?
- Reset and run again

Real case: MAS and pump on field trial



Vibration alarm!

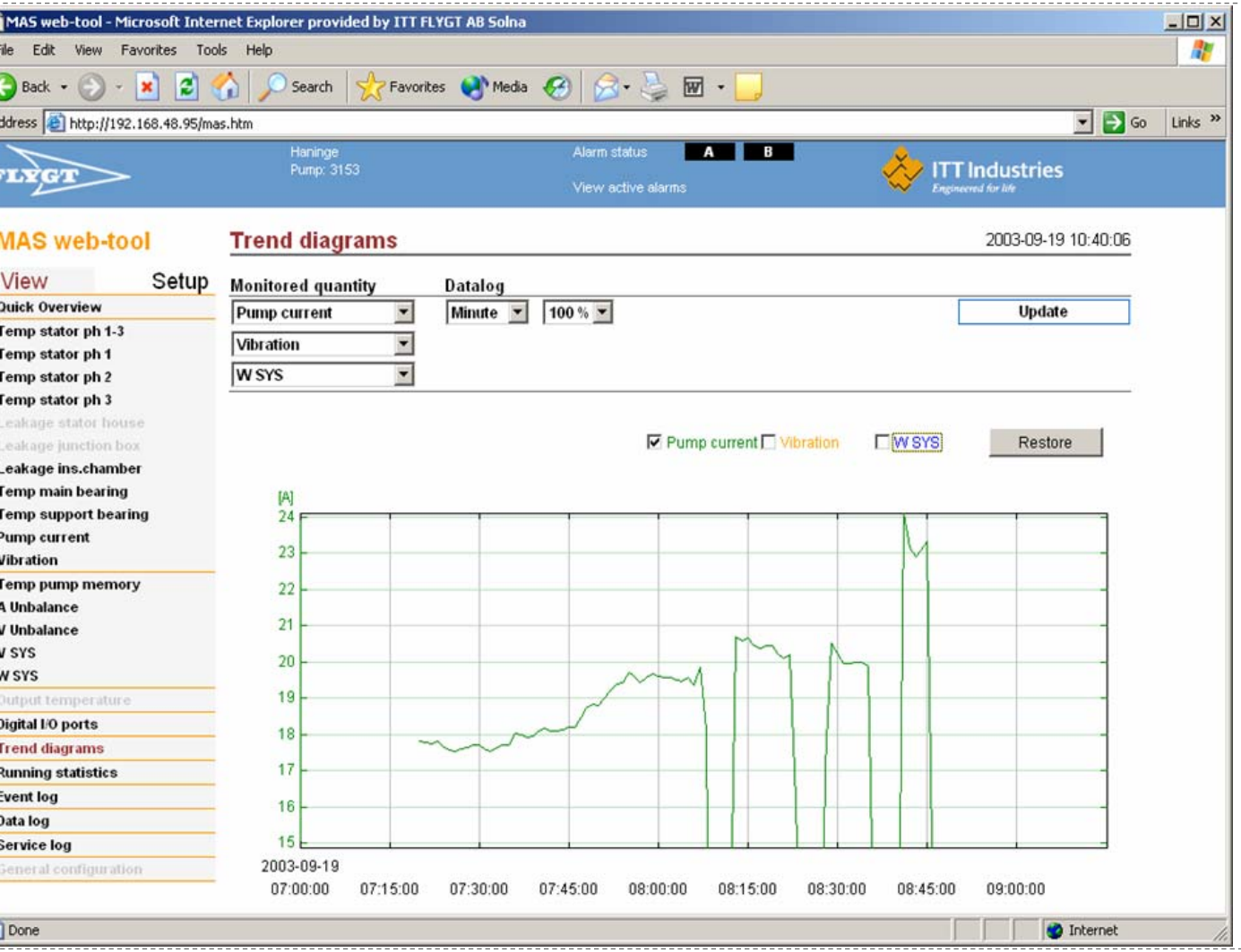


- Alarm log plot
- Black box function
- 10 minutes of data
- Vibration: 14 mm/s

Flygt

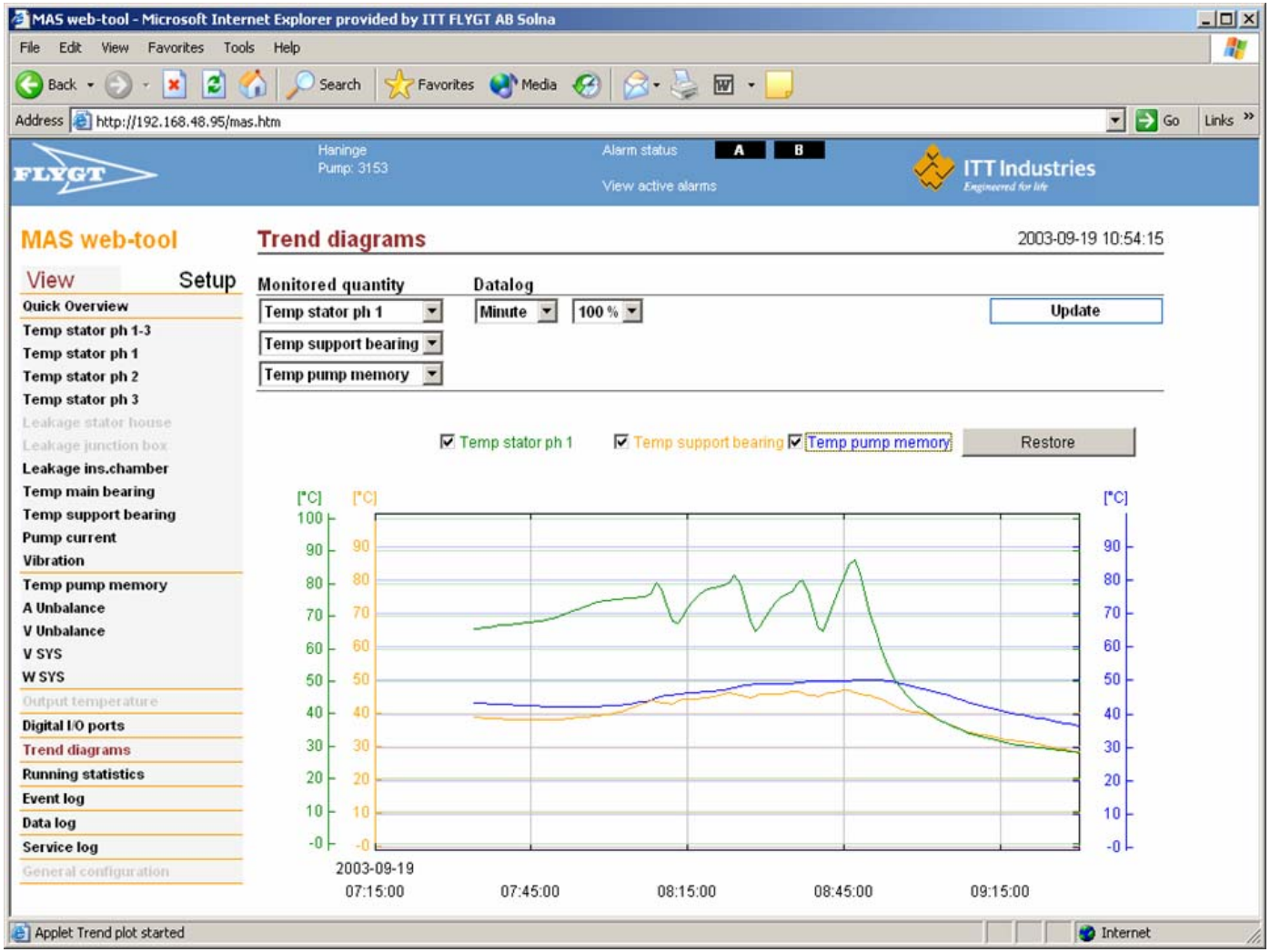
ITT Industries

Pump current



- 2 hours of data
- Increasing trend!

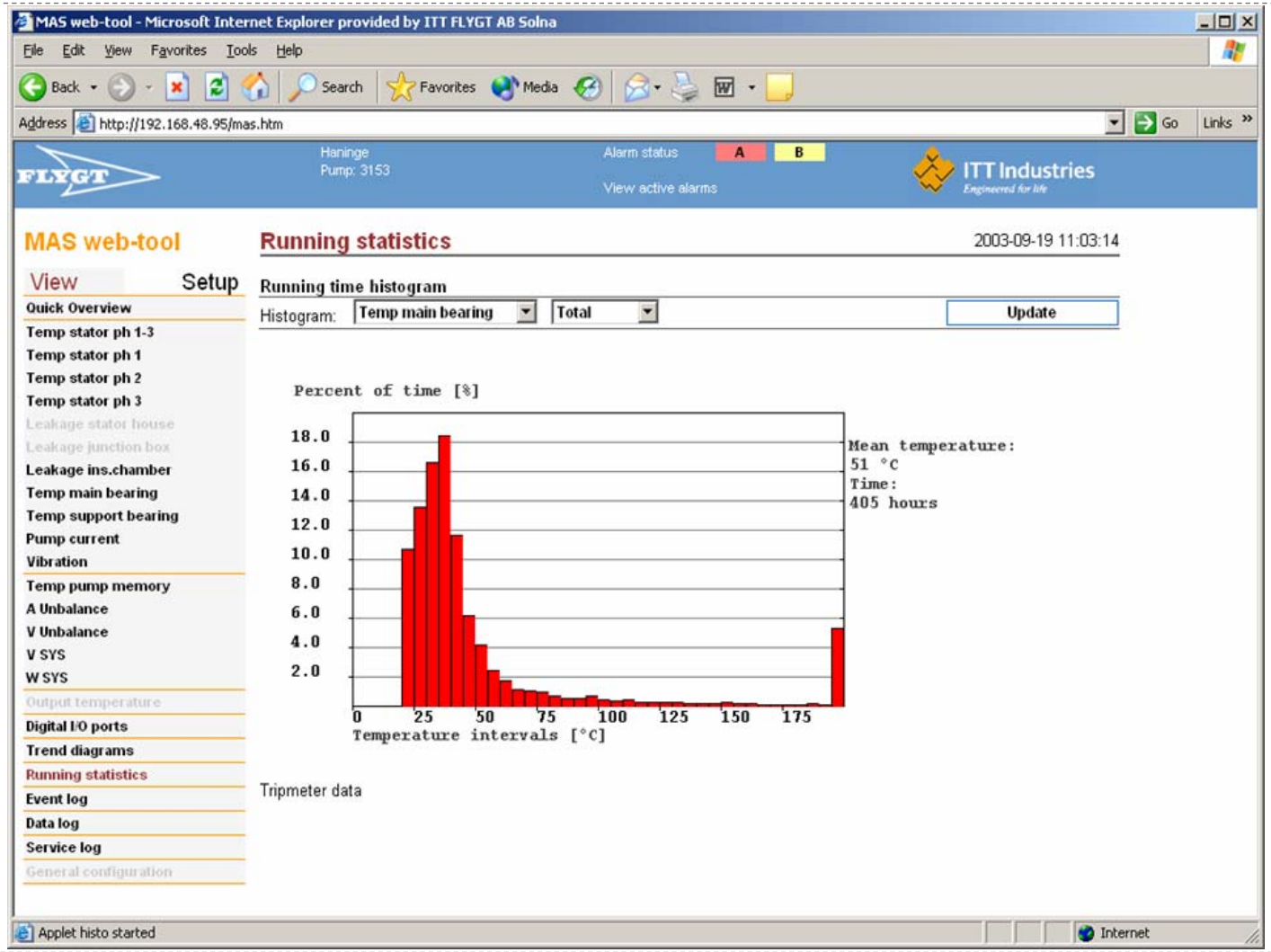
Temperatures also rise



Here's the problem!

Rags, plastic and a bird?

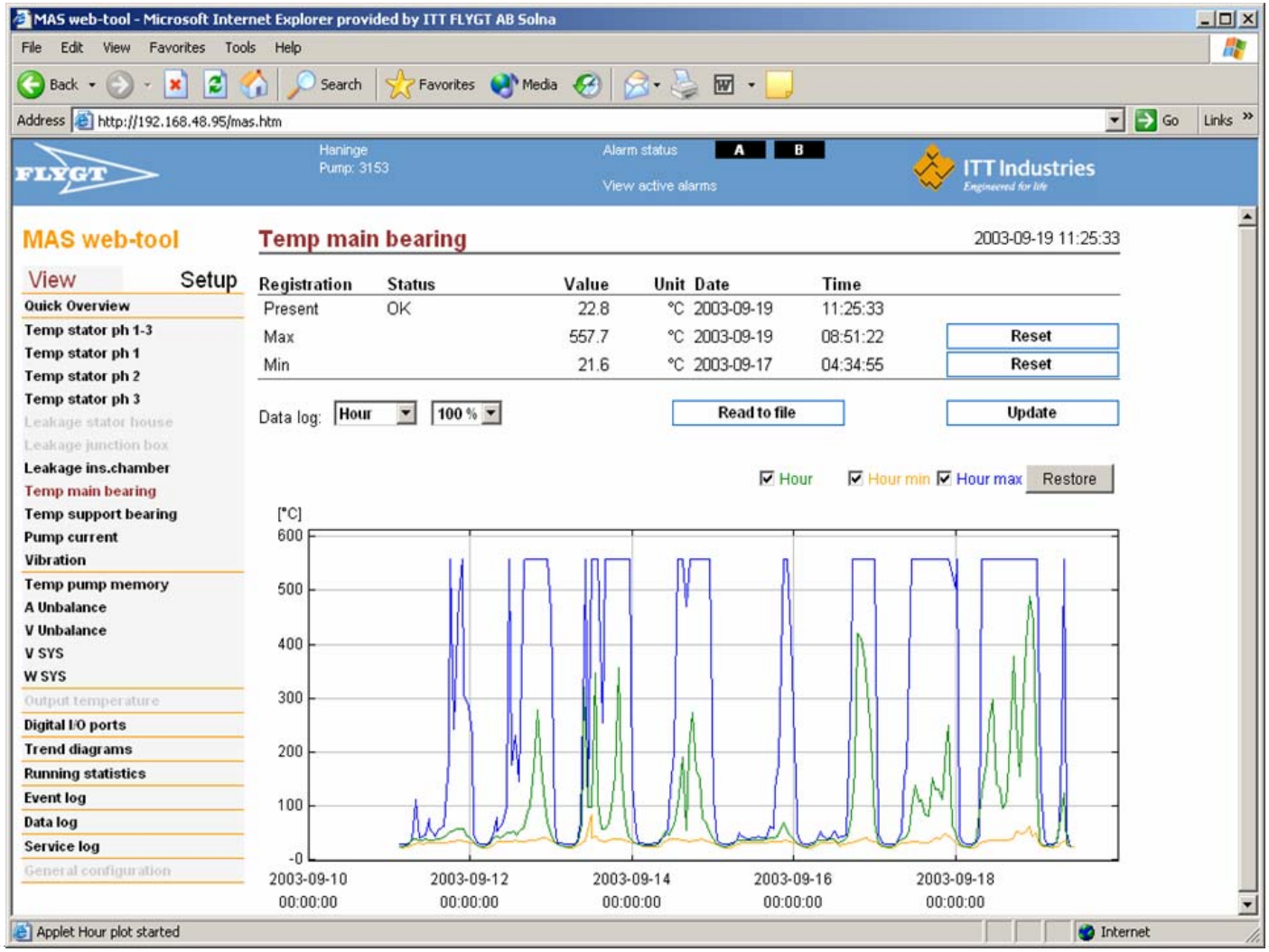
Reveal Pt100 glitch with histogram



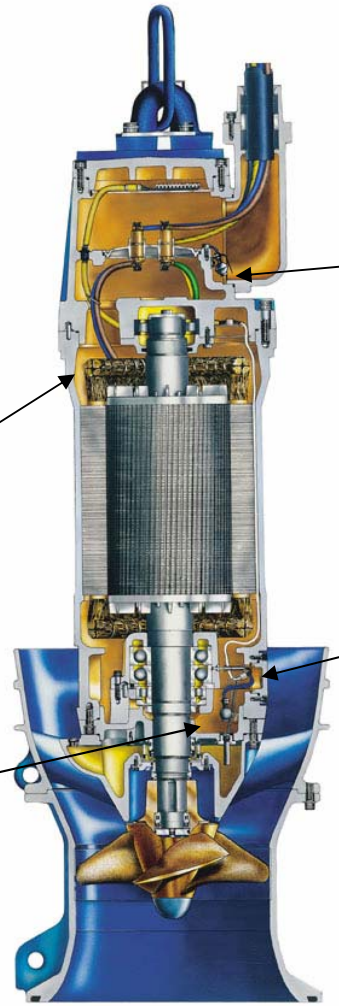
Flygt

ITT Industries

Reveal Pt100 glitch with max value curve



CAS monitoring standard



Leakage
connection housing

Thermal switches
stator winding

Temp measurement
main bearing

Leakage
stator housing

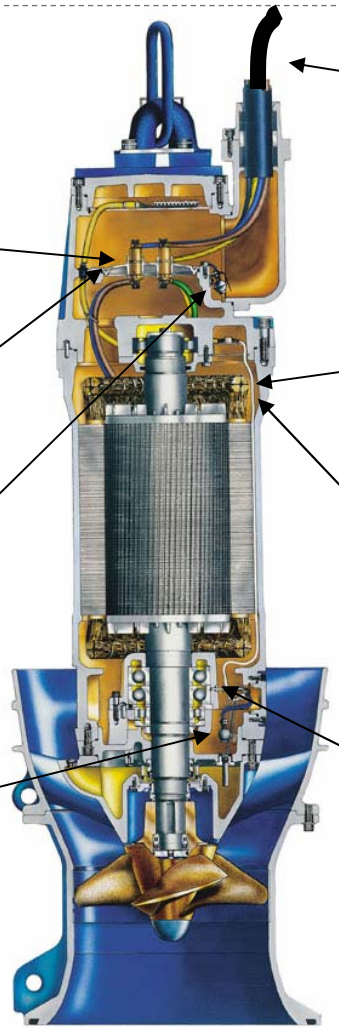
MAS standard for Great & Grey

Pump memory
- *Data plate info*
- *Acc. running time*
- *No of starts*

Temp measurem. pump memory

Leakage connection housing

Leakage stator housing



Current (1 phase)

Thermal switches stator winding

Temp measurement stator winding (1)

Temp measurement main bearing

MAS G&G – All options included

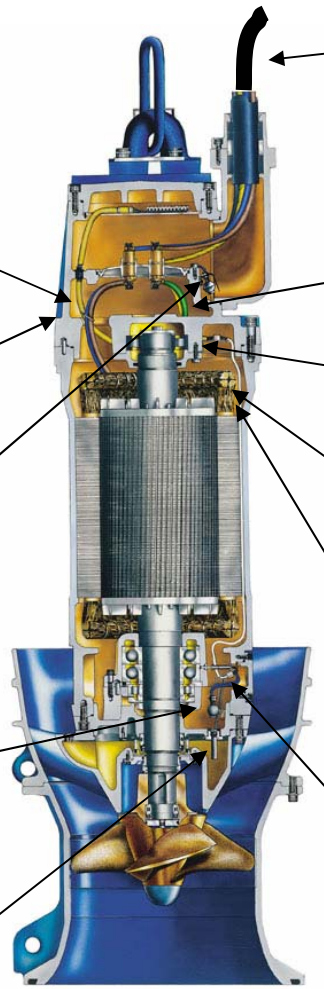
Pump memory
- *Data plate info*
- *Acc. running time*
- *No of starts*

Temp measurem. pump memory

Leakage connection housing

Leakage stator housing

Leakage oil housing



Current (1 phase)

Option: Power, current (3 phases), voltage, energy

Vibration

Temp measurement support bearing

Thermal switches stator winding

Temp measurement stator winding (3)

Temp measurement main bearing

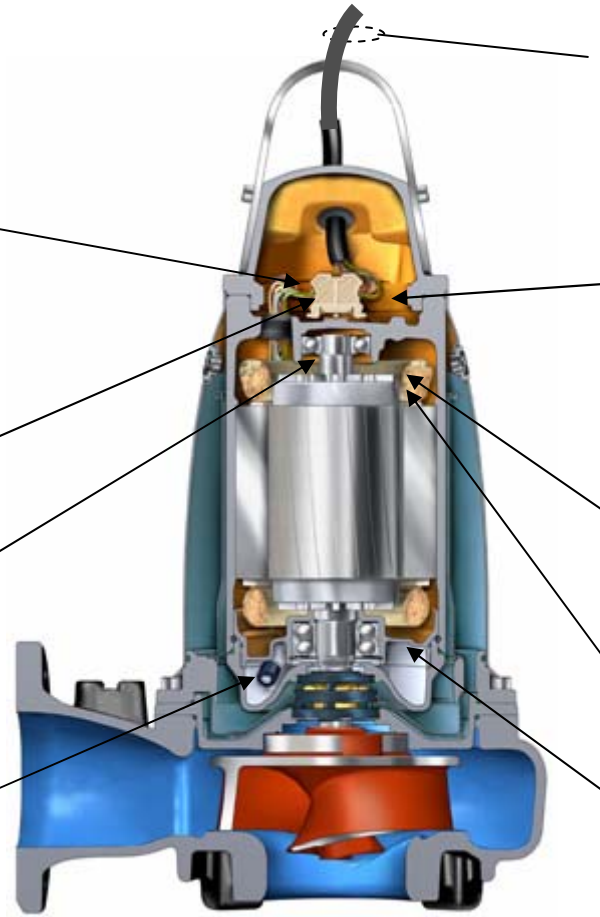
MAS options for 'Midrange'

Pump memory
- *Data plate info*
- *Acc. running time*
- *No of starts*

Temp measurem. pump memory

Leakage connection housing

Leakage inspection chamber



3153 not available with 24-lead SubCab

Current (1 phase)

Option: Power, current (3 phases, voltage, energy

Vibration

Temp measurement support bearing

Thermal switches stator winding

Temp measurement stator winding (1) (3)

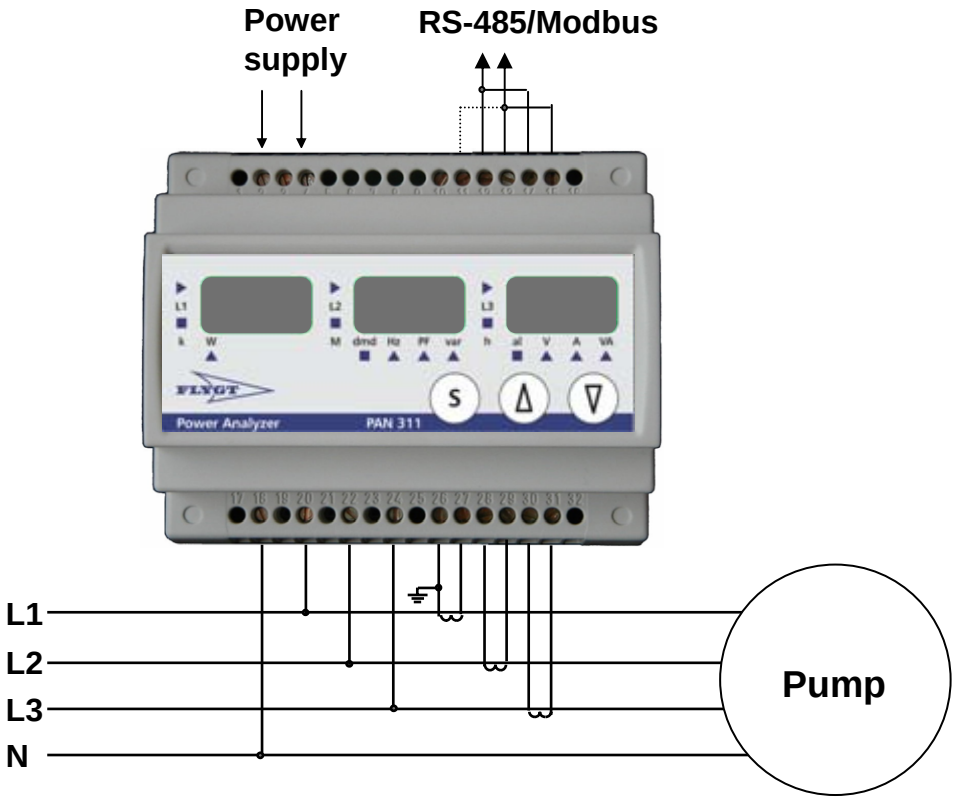
Temp measurement main bearing

MAS 711 Pump/drive unit sensor compatibility chart

Pump Model	Drive Unit	SENSORS									
		(1) Pump Memory	(1) Junct. Chmbr FLS	(3) Stator Therm. Sw.	(1) Stator PT-100	(3) Stator PT-100	(1) Lower Brg. PT-100	(1) Upper Brg. PT-100	(1) Stator Housing FLS	(1) Leakage Chmbr FLS	(1) Vibration Sensor
N-3153	xxx	■	OPTION	■	■	N / A	OPTION	N / A	N / A	■	N / A
N-3171	xxx	■	OPTION	■	■	OPTION	OPTION	OPTION	N / A	■	OPTION
N-3202	xxx	■	OPTION	■	■	OPTION	OPTION	OPTION	N / A	■	OPTION
N-3301	xxx	■	OPTION	■	■	OPTION	OPTION	OPTION	N / A	■	OPTION
C / N / L / P	.6x5	■	■	■	■	OPTION	■	OPTION	■	N / A	OPTION
C / N / L / P	.7x5	■	■	■	■	OPTION	■	OPTION	■	N / A	OPTION
C / N / L / P	.8x5	■	■	■	■	OPTION	■	OPTION	■	N / A	OPTION
C / N / L / P	.9x5	■	■	■	■	OPTION	■	OPTION	■	N / A	OPTION
P / L	.600	Not available MAS-connected									
P / L	.680	■	■	■	■	OPTION	OPTION	N / A	■	N / A	N / A
PL-7050	.760	■	■	■	■	OPTION	■	OPTION	■	N / A	OPTION
PL-7050	.770	■	■	■	■	OPTION	■	OPTION	■	N / A	OPTION

- Chart valid only if pumps are ordered MAS-connected
- N3153-N3301 and drive unit 680 will be handled on special order
- Note: Drive unit 600 not compatible with MAS
- Power analyzer PAN311 is optional with all pump models

Option – Power analyzer PAN 311



Data transfered to MAS:

- Power
- Energy
- Power factor
- System current
- Current in three phases
- System voltage
- Voltage in three phases
- Current unbalance
- Voltage unbalance

- RS-485/Modbus com. to MAS

Extensive field testing performed...

...at Powell's Creek in the US...

...in Köping, Sweden...

..and at three other places.

MAS-features (compared to CAS)

- Ease of use thanks to the 'Web tool'
- Alarm log plot for troubleshooting
- Inputs for all optional Flygt pump sensors
- Serial com ports to other systems
- Memory for logging (1 Mbyte)
- Integral part of a complete system with FMC and AquaView
- Pump memory with data plate, configuration data etc.
- ...

MAS price in relation to CAS

MAS costs more but eliminates the need for:

- Extra relays for Pt100 or thermistor
- Panel mounted current meter
- Running time meter
- Start counter

Introduction Q2 2004